

BIOLOGICAL EVALUATION OF THE SOUTHERN PINE BEETLE
ON THE HOLLY SPRINGS NATIONAL FOREST IN MISSISSIPPI

by

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A biological evaluation was conducted on the Holly Springs National Forest from October 9 - 11. The purpose of the evaluation was to determine the current status of southern pine beetle (Dendroctonus frontalis Zimmerman) populations on the Holly Springs District and to determine what action, if any, would be necessary in FY 80.

METHOD OF EVALUATION AND ANALYSIS OF SPB INFESTATION

Aerial Survey and Ground Checks

Standard aerial sketch map procedures were used for this evaluation, except that survey coverage was 100 percent.^{2/} The survey was made by district personnel and spots of red and/or fading trees were recorded and plotted on Forest Service Class A maps. Ten spots were ground checked.

Numbers of vacated and infested trees, basal area, and age were recorded in the ground check. Bark samples for attack:emergence analysis were collected.^{3/}

Attack:Emergence Evaluation

The attack:emergence analysis procedure for estimating subsequent tree mortality from SPB infestations was adapted as a predictive tool.^{4/ 5/}

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^{2/} Detection of Forest Pests in the Southeast, 1970. USDA, Forest Service, Southeastern Area, State and Private Forestry, Publ. S&PF-7 Atlanta, Ga. 51 pp.

^{3/} Moore, G. E. 1977. Factors for determining trends in southern pine beetle spots. J. Environ. Entomol. Vol. 7, No. 3, pp. 335-341.

^{4/} Ibid.

^{5/} This methodology is being used on a trial basis. Further analysis and evaluation must be made before further use.

This procedure predicts future spot growth based on the ratio of southern pine beetles entering the trees to the number of beetles emerging (this is both attacking adults and developed brood). For purposes of this evaluation, the procedure will be referred to as the attack:emergence ratio. A prediction of SPB increase would require an attack:emergence ratio of 1:10 or greater. Attack:emergence ratios for spots predicted to remain static in growth would be 1:5 - 1:9.9. A decreasing population would have an attack:emergence less than or equal to 1:4.9. This procedure has been proven on a spot basis for a 2-year-period in North Carolina.^{6/}

This evaluation assumes that spot growth as predicted by the attack:emergence bark sample analysis is indicative of SPB population growth on the forest on an area basis. For example, if attack:emergence ratios predict increased populations within the sample spots, then the assumption would be that an increased amount of volume will be lost (or an increased number of trees will be killed) by SPB areawide on that district.

Volume Protected Determination

The volume which would be protected by having a project was estimated by use of spot growth formulae. Spot growth formulae estimate the amount a spot would grow if not salvaged. The difference between salvage volume and the size the spot would have grown if left alone is the volume protected.^{7/}

RESULTS

Aerial Survey and Ground Checks

A total of 48 SPB spots were found on the Holly Springs National Forest. Spots ground checked ranged from six trees to approximately 100 acres in size. Ground check data and attack:emergence bark analysis data were collected on 10 spots (table 1).

Attack:Emergence Evaluation

The average attack:emergence ratio for Holly Springs was found to be increasing (A:E = 1:20). Based on the attack:emergence procedure, FY 80 losses should be from 1.5 - 2.0 times the loss experienced in FY 79.

^{6/} Moore, Op. Cit.

^{7/} Hedden, R. L. 1979. Southern pine beetle spot growth inactivity in east Texas. Forest Sci. In press.

Table 1. Summary of ground check data and attack:emergence bark analysis data for Holly Springs National Forest, Mississippi, October 1979.

| Total No. Trees | No. Infested Trees | | | No. Vacated Trees | | Attack:Emergence Ratio | Red:Green ^{a/} Ratio |
|--------------------|--------------------|-------|------------------|-------------------|--|---------------------------|----------------------------------|
| | Total | Green | Reds & Faders | Total | | | |
| 6 | 5 | 1 | 4 | 1 | | <u>b/</u> | 1:0.25 |
| 17 | 2 | 0 | 2 | 15 | | <u>b/</u> | 1:0 |
| 39 | 22 | 11 | 11 | 17 | | 1:17.0 | 1:1.0 |
| 54 | 44 | 13 | 31 | 10 | | 1:42.8 | 1:0.41 |
| 56 | 18 | 9 | 9 | 38 | | 1:19.9 | 1:1.00 |
| 86 | 81 | 45 | 36 | 5 | | 1:13.0 | 1:1.25 |
| 243 | 143 | 74 | 69 | 100 | | 1:20.5 | 1:1.07 |
| 253 | 128 | 36 | 92 | 125 | | 1:23.0 | 1:0.39 |
| 433 | 233 | 193 | 40 | 200 | | 1:11.6 | 1:4.83 |
| 1066 | 466 | 255 | 211 | 600 | | 1:12.0 | 1:1.21 |
| | | | | | | $\bar{x} = 1:20.0$ | $\bar{x} = 1:1.14$ |

^{a/} Based on numbers of infested reds and faders compared to numbers of green infested trees. Average R:G = 1:1.1: that is, an average of 1.1 green trees is present for each infested red and fading tree in the sample spots.

^{b/} No attack:emergence ratio is calculated for these spots because trees were not suitable for sampling.

Basal areas ranged from 110-160. The red:green tree ratio averaged 1:1.1. It was felt the red:green tree ratio was lower at the time of observation than would have been the case a few weeks earlier. A large number of red infested trees were present, possibly caused by cool weather slowing down beetle development, thus reducing the ratio. Also, a large volume of overmature timber was present where SPB activity occurred. Of the 10 spots ground checked, only one was less than 60 years old and four were greater than 80 years old. Due to the high basal areas in old growth timber, combined with the high attack:emergence ratio and large number of green infested trees (table 1), an increasing condition of 2.0 was considered the best prediction for FY 80 losses. Thus, FY 80 mortality should be two times greater than the mortality sustained in FY 79.

Volume Protected Determination

Total volume protected as derived from Hedden's spot growth formula was found to be 1,216 MBF.

DISCUSSION AND RECOMMENDATIONS

SPB suppression activities should continue on this forest. A salvage control action will minimize losses and prevent spot growth by removing infested material from the forest. However, it should be noted that this forest has a history of annosus root rot (Fomes annosus (Fr.) Karst.). Annosus root rot was found in one of the spots ground checked. Sites with annosus root rot have been shown to be problem SPB areas. Salvage cutting may increase the chance of annosus root rot spreading from freshly infected stumps through root grafts to the adjacent stand. These trees may become infected in 3 to 7 years and would then be more susceptible to SPB attack. Since the distinctive annosus root rot conks cannot always be found in infected stands, the following precautionary measure is recommended for high hazard root rot sites. Treat the freshly cut stumps of a 70 ft buffer strip next to the residual stand with a solution containing the competing fungus, Peniophora gigantea (Fr.) Masse. Specific training with regard to SPB and annosus root rot suppression will be provided prior to May 1980.

Chemical suppression and/or cut-and-leave tactics are recommended only for inaccessible spots or for small spots that cannot be administered any other way. Forest Insect and Disease Management, Pineville, La., should be contacted prior to the extensive use of chemical control for an update on latest restrictions or application procedures. If cut-and-leave is to be used, district personnel should plan a training session with FI&DM before the summer season (summer is the only time this method is recommended for use). All suppression activity should be done in accordance with the 3400 section, FSM, and the project control plan for the forest.

Predicting future timber mortality is difficult due to the occurrence of overlapping generations of beetles each year. The attack:emergence technique used for this evaluation predicts a mortality trend. This prediction technique has been proven accurate on a spot basis, but

work continues to adapt these predictions to an area basis. For purposes of this evaluation, assumptions are that spot sizes and distribution within each age class of timber will remain the same.

While direct suppression activities are necessary, it is also possible to reduce future losses through preventative measures. Maintaining healthy, thrifty stands is one of the better ways to prevent SPB losses.

Here are stand conditions the prescriptionist should look for to reduce SPB losses:

1. Avoid basal areas in excess of 120 sq ft/ac. Older, dense stands should be thinned as heavily as R-8 guides allow.
2. Make sure species are matched to site.
3. Note presence of littleleaf or annosus root rot sites. These sites have been shown to be problem SPB areas.
4. Plan for as little disturbance as possible when these stands are thinned. Damaged stands are more susceptible to bark beetle attack.

A vigorous SPB population capable of causing increased losses in FY 80 is present on the Holly Springs National Forest. It is important that suppression action be taken to minimize timber loss and to stop spot growth in the larger spots. Because of expected SPB activity, the forest needs to plan enough technician time to implement the work required to meet project objectives.

For further information, contact Forest Insect and Disease Management, Pineville Field Office, Pineville, La 71360, (Phone FTS 497-3311, or Commercial 318-445-6511, Ext. 311).